

Notes from my herbarium. V.

WALTER DEANE.

My seedling collection.

As the spring of 1895 opened and the first delicate green began to appear, I found myself considering how I should add to my herbarium. All the plants that I might collect in the vicinity of Cambridge were already represented in my collection in flower, fruit, root and seed, and it seemed at first as if I must wait till the summer vacation might give me an opportunity of visiting some fresh locality. I was strolling one day over a bit of waste land, watching the little plants pushing their tiny heads above the ground, and thinking how impossible it was for me to name a single one of them in that early stage of their growth, when suddenly it occurred to me to make a collection of seedlings. Why shouldn't they have a place and an important place, too, in an herbarium? They are the beginning, the promise of the future plant, and yet we pass them by and refuse to recognize them. Then it would be interesting to compare these early forms with the full-grown plants and to see how the leaves in the two cases resembled each other. So I decided then and there to make a collection of as many seedlings as I could. This I did, and during the months of May, June and July I was engaged in as fascinating a piece of work as I have ever done in a botanical way.

My principal collecting grounds in Cambridge were of three kinds, waste land such as produces the ordinary garden weeds, a bit of bog frequented only by the botanist, and a salt marsh. My baby press and collecting box were constant companions and they never did better service. When I found a patch of seedlings, I collected a number of them carefully, and if they were small enough, as was generally the case, they went right into the little press. I then marked the spot in some way for future visits, and in the case of some species I made as many as half a dozen trips to the same patch, taking away specimens each time, for I wanted the collection to show the species from the seedling to the full grown plant, or at least to an identifiable form, all collected from the same spot. Some-

times the little fellows would betray their names very soon, and again I would wonder and wonder before I could compel the reluctant plant to reveal itself. Patience, however, always brought its reward.

There are difficulties, nevertheless, that are sometimes insuperable. A drought may dry up the precious spot after weeks of careful watching. In one instance I watered constantly a patch of weeds which I was afraid would not reach maturity, and I was rewarded with fine specimens. Cattle may crop the cherished plants just as you are expecting good returns for your care. I had collected seedlings of a *Polygonum*. The plants were advanced enough to show that they were either *Polygonum Convolvulus* L., the black bindweed, or *P. dumetorum* L., var. *scandens* Gray, the climbing false buckwheat. I wanted to see the calyx lobes, but when I visited the spot at the right time for fruit, the plants were all eaten down by cows. The weeds, however, were persistent, and later recovered entirely and told me the story of their name. It was the latter species. These instances are enough to show what may happen to disappoint the seedling hunter. Of course the cultivating of seedlings would obviate all this trouble, but I wanted the plants from their own native habitat. That gave additional zest and exercise.

One plant kept me guessing for some time. Near the banks of Charles river by a salt marsh there was a large patch of the most beautiful green. I found it to be composed of myriads of seedlings not more than half an inch in height. What were they? The small linear cotyledons told me no story. I felt all the enthusiasm of a beginner analyzing a new flower. As the little plants grew, I narrowed my guesses, till a premature blossom on a specimen not much over an inch high, told me it was *Buda marina* Dumort., the salt sand-spurrey, common enough to us all in its full dress. I shall always know it hereafter in its baby clothes. Its cotyledons much resemble, in miniature, the later leaves.

The limits of this paper will not allow a discussion of all or nearly all my seedlings, for during these delightful three months I collected between fifty and sixty species. Mention of a few may, however, be of interest. In Falmouth, Mass., early in July I found at the head of the beach in the clear sand, seedlings of some interesting species of coast plants. I was particularly attracted to *Lathyrus maritimus* Bigelow, the beach

pea, an account of whose long rootstocks I wrote in the first paper of this series. The old plants were a foot high and in flower, while scattered about among them were small plants an inch or so above the sand. I found that these were of two kinds, readily distinguishable after a short examination, namely, seedlings and young shoots from old rootstocks. I made collections of both. In almost every case the pea was attached to the seedling and it was always from two to four inches below the surface of the sand. How does the pea invariably reach that depth where the necessary moisture is always present? The constant fall winds which blow over the evershifting sands partially account for that. And yet, in the case of the little seedlings of *Euphorbia polygonifolia* L., the spurge, and *Atriplex arenarium* Nutt., the orach, as well as *Solidago sempervirens* L., the seaside goldenrod, and others which I collected in quantity, the size and position of the plants show that their seeds lay much nearer the surface of the sand, though subjected to the same conditions as those of the beach pea. In seedlings of *Xanthium Canadense* Mill., var. *echinatum* Gray, the cockle burr, the burr enclosing the akenes is buried to the same depth as that of the beach pea. This question of the distance below the surface attained by different seeds is worthy of examination. The roots of the pea seedlings, of which I examined a large number, were delicate and very white, and penetrated the moist sand for four inches below the pea. In one instance I dug up a whole pod still containing a single pea which had sprouted and sent its seedling above the sand. The pod was soft and moist, and would soon have decayed.

In Whitefield, N. H., in the rich northern woods, I made some valuable additions to my collection. It was much harder to find the seedlings in the luxuriant growth that carpets the floor of those grand forests of birch, ash, spruce, pine and maple. In the deep shade half hidden amongst the low growth that covered the ground, were seedlings innumerable even in the latter half of July. I found in abundance all forms of three of the northern maples, *Acer Pennsylvanicum* L., the striped maple, or moose-wood, *A. spicatum* Lam., the mountain maple, and *A. rubrum* L., the red or swamp maple.

In *Acer Pennsylvanicum* L., the cotyledons are from one-half to three-fourths of an inch long and narrowly obovate in shape. The first pair of leaves are ovate, heart-shaped,

taper-pointed and doubly toothed, but with no suggestion of the three lobes so characteristic of the typically developed leaf. This primitive form occurs at times even in the sixth pair of leaves, while again in the second pair the lobing becomes manifest. I have one specimen in which the third pair of leaves are very typical, while the fourth pair on the same plant have lost their lobes. This is significant when we compare the seedlings with the old plant, for in the latter case the shape of the leaves varies very much, the same tree producing every form from the typical leaf to one resembling in every detail but size the first pair of leaves above the cotyledons.

In *Acer spicatum* Lam. the seedlings very nearly resemble those of the former closely related species, and there is the same gradation to the typical leaf. The coarse serration of the developed leaf is shown in the first leaves. The downy character of the under surface of the leaf does not, however, appear till the plant is pretty well developed. The leaves on the ends of new shoots in the old plants resemble in shape and size the first leaves of the seedlings. In *Acer rubrum* L. the cotyledons are broadly linear and the first leaves have clearly the whitish under surface peculiar to the type. In shape they behave much like the two former species.

One day I was hunting in the woods on my hands and knees for new plants, when I saw a seedling with oblong thick cotyledons some two inches long. The first pair of leaves had developed. They were simple, oval, acute, serrate, and I thought that I had found at last a young birch. Judge my surprise when, on carefully removing the plant from the black mould in which it was growing, I found still attached to the base the key of the black ash, *Fraxinus sambucifolia* Lam. My seedlings of this species as well as those of the white ash, *Fraxinus Americana* L., resemble almost exactly those figured in Sir John Lubbock's work on Seedlings. The leaves above the first pair soon begin to show signs of their compound character and are of very varied shapes. I have one small plant of several years' growth. It is nine inches high and bears but one pair of leaves, both simple. One is four and one-half inches long, the other three-eighths of an inch. The woods in Whitefield were full of the yellow birch, *Betula lutea* Mx. f., and the little seedlings were very abundant. The cotyledons are orbicular in outline with short petioles, and

the first leaves are ovate and coarsely toothed. I have a complete series of twenty-six specimens from the young seedling with fruit attached, through the varying forms to the leaves and bark of the old tree. Leaves of plants a foot high are much narrower than those of the developed form. On an old prostrate moss-grown log, I collected all forms of this birch, growing in a row as if awaiting the collector.

It was pretty delicate work mounting my seedlings. The choice lay between gum strips, gluing, and paper pockets. I decided to use the last two methods. I glued the plants in the usual way, picking them up one by one with nippers. The process was slow, but the results most excellent. Thirty specimens sometimes are on a single sheet. They are arranged in various symmetrical lines and graded according to age. Paper pockets contain extra specimens in many instances.

This short sketch of a few of my seedlings is perhaps enough to show that they should be well represented in our herbaria. Their germination has been studied by specialists in many cases, and why should we not be able to display them when we show the flowering and fruiting forms of the adult plant? And there are many other forms of our common species, besides the seedling and the old plant that should also be collected and made ready for study. There are those intermediate stages well illustrated in the early leaves of the water parsnip, *Sium cicutaefolium* Gmelin. These leaves show every gradation from the typical pinnate forms with serrate leaflets to the submersed leaves with the finest hair-like dissections. It is always the lowest leaves that show the greatest variation from the type. Sometimes these are very large, even from fifteen inches long to five inches broad. It is not always the submersed leaves that show this dissection, for I have collected specimens in Cambridge, growing entirely out of water, where the lower leaves are about intermediate between the two extremes. They are erect, while the submersed forms are extremely weak. Does not this show some connection between this species and the polymorphous *Sium Carsonii* Durand? These and many such questions must be answered by the specialist, and surely the interests of science will be furthered if our herbaria are well stocked with all these connecting forms from seed to seed.

Cambridge, Mass.